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Kovinski industrijski cevovodi - 5. del: Pregled in preskušanje

Metallic industrial piping - Part 5: Inspection and testing

Metallische industrielle Rohrleitungen - Teil 5: Prüfung

Tuyauteries industrielles métalliques - Partie 5: Inspection et contrôle

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77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use

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English Version

Metallic industrial piping - Part 5: Inspection and testing

Tuyauteries industrielles métalliques - Partie 5: Inspection et contrôle

Metallische industrielle Rohrleitungen - Teil 5: Prufüng

This European Standard was approved by CEN on 8 May 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 13480-5:2012) has been prepared by Technical Committee CEN/TC 267 “Industrial piping and pipelines”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2012, and conflicting national standards shall be withdrawn at the latest by December 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard EN 13480 for metallic industrial piping consists of eight interdependent and not dissociable Parts which are:

- *Part 1: General;*
- *Part 2: Materials;*
- *Part 3: Design and calculation;*

- *Part 4: Fabrication and installation;*
- *Part 5: Inspection and testing;*
- *Part 6: Additional requirements for buried piping;*
- CEN/TR 13480-7, *Guidance on the use of conformity assessment procedures*;
- *Part 8: Additional requirements for aluminium and aluminium alloy piping.*

Although these Parts may be obtained separately, it should be recognised that the Parts are inter-dependant. As such the manufacture of metallic industrial piping requires the application of all the relevant Parts in order for the requirements of the Standard to be satisfactorily fulfilled.

This European Standard will be maintained by a Maintenance MHD working group whose scope of working is limited to corrections and interpretations related to EN 13480.

The contact to submit queries can be found at http://portailgroupe.afnor.fr/public_espacenormalisation/CENTC267WG8/index.htm. A form for submitting questions can be downloaded from the link to the MHD website. After subject experts have agreed an answer, the answer will be communicated to the questioner. Corrected pages will be given specific issue number and issued by CEN according to CEN Rules. Interpretation sheets will be posted on the website of the MHD.

This document supersedes EN 13480-5:2002+A1:2011. This new edition incorporates the Amendments/the corrigenda which have been approved previously by CEN members, and the corrected pages up to Issue 17 without any further technical change. Annex Y provides details of significant technical changes between this European Standard and the previous edition.

Amendments to this new edition may be issued from time to time and then used immediately as alternatives to rules contained herein. It is intended to deliver a new Issue of EN 13480:2012 each year, consolidating these Amendments and including other identified corrections.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This Part of this European Standard specifies the requirements for inspection and testing of industrial piping as defined in EN 13480-1:2012 to be performed on individual spools or piping systems, including supports, designed in accordance with EN 13480-3:2012 and EN 13480-6:2012 (if applicable), and fabricated and installed in accordance with EN 13480-4:2012.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 287-1:2004+A2:2006, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 473:2008, *Non destructive testing — Qualification and certification of NDT personnel — General principles*

EN 571-1:1997, *Non destructive testing — Penetrant testing — Part 1: General principles*

EN 970:1997, *Non-destructive examination of fusion welds — Visual examination*

EN 1418:1997, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

EN 1435:1997+A1:2002+A2:2003, *Non-destructive examination of welds — Radiographic examination of welded joints*

EN 12517:1998, *Non-destructive examination of welds — Radiographic examination of welded joints — Acceptance levels*

EN 13480-1:2012, *Metallic industrial piping — Part 1: General*

EN 13480-2:2012, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2012, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4:2012, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-6:2012, *Metallic industrial piping — Part 6: Additional requirements for buried piping*

CEN/TR 13480-7:2002, *Metallic industrial piping — Part 7: Guidance on the use of conformity assessment procedures*

EN ISO 5817:2007, *Arc welded joints in steel — Guidance on quality levels for imperfections (ISO 5817:2003 +Cor.1:2006)*

EN ISO 6520-1:2007, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 11666:2010, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels (ISO 11666:2010)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15609-2:2001+A1:2003, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 2: Gas welding (ISO 15609-2:2001)*

EN ISO 17635:2010, *Non-destructive testing of welds — General rules for metallic materials (ISO 17635:2010)*

EN ISO 17638:2009, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638:2003)*

EN ISO 17640:2010, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment (ISO 17640:2010)*

EN ISO 23277:2009, *Non-destructive testing of welds — Penetrant testing of welds — Acceptance levels (ISO 23277:2006)*

EN ISO 23278:2009, *Non-destructive testing of welds — Magnetic particle testing of welds — Acceptance levels (ISO 23278:2006)*

EN ISO 23279:2010, *Non-destructive testing of welds — Ultrasonic testing — Characterization of indications in welds (ISO 23279:2010)*

CEN ISO/TR 15608:2005, *Welding — Guidelines for a metallic materials grouping system (ISO/TR 15608:2005)*

3 Terms and definitions

For the purposes of this Part of this European Standard, the terms and definitions given in EN 13480-1:2012 shall apply.

4 Symbols and abbreviations

For the purposes of this Part of this European Standard, the symbols given in EN 13480-1:2012 apply together with the following abbreviations:

— LT Leak test;

— NDT Non-destructive testing;

— MT Magnetic particle testing;

— PT Penetrant testing;

— RT Radiographic testing;

— UT Ultrasonic testing;

— VT Visual examination;

— PWHT Post-weld heat treatment.

5 Determination of inspection and testing requirements

5.1 General

The fabricator and/or installer shall be responsible for carrying out the testing, examinations and certification specified in this European Standard, for all piping fabricated to EN 13480-4:2012. These requirements are specified in clauses 6 to 10. Where required in the technical specification, additional examination and testing shall be performed.

NOTE For guidance on the use of conformity assessment procedures see CEN/TR 13480-7:2002.

5.2 Classification of piping

Industrial piping shall be classified in accordance with EN 13480-1:2012, Table 5.1-1.

NOTE 1 Categories I to III are identical to categories I to III of the Pressure Equipment Directive.

NOTE 2 The requirements for classification of industrial piping that is to be installed in a Member State of the EU and which is covered by the scope of the Pressure Equipment Directive and the appropriate conformity assessment are given in the Pressure Equipment Directive.

5.3 Testing and inspection procedures

Testing and inspection shall be carried out by personnel trained for the method used. European Standards or written procedures (if necessary) detailing the method and acceptance criteria shall be available to all testing personnel and inspectors. Records shall be kept to demonstrate that all required testing and inspection have been carried out and that the results are acceptable.

6 Design validation

6.1 Objective and extent

Before fabrication/installation commences, a validation of the piping design and its supports shall be performed. The validation shall be carried out independently from the team that prepared the design, and independent from fabrication/installation.

The design validation includes the pressure walls to the first joint with other pressurised components. It also includes the interaction with components directly connected to the piping, but does not include validation of the components themselves.

The design validation shall be performed to verify that the piping meets the requirements of this European Standard with regard to materials, design details and dimensions, and that the requirements of procedures and personnel can be met during fabrication.

Where the design of parts has already been validated in accordance with this European Standard, and where an appropriate certificate or assessment report is available, a further design validation shall not be required.

6.2 Documentation

6.2.1 General

Documentation shall be provided to demonstrate compliance with this European Standard and shall include construction drawings, parts lists, design calculations and the technical schedule for fabrication/installation.

6.2.2 Design calculations

6.2.2.1 Where calculations are performed by hand or with the aid of a computer, the following minimum data shall be provided:

— explanation of notations;

— calculation input data, including material details;

— reference number of the standard including the edition and reference number of the formula;

— full traceability of the calculations performed;

— results of intermediate formulae;

— calculated minimum thickness or the calculated stress compared with the design stress;

— corrosion, wastage and other allowances where applicable;

— thickness tolerances;

— the selected thickness.

6.2.2.2 Where stress analysis is carried out by numerical methods, e.g. finite element method, boundary element method or other design methods, it shall be documented.

Documentation shall include at least the following data:

— explanation of notations;

— details of the computer program;

— assumptions for calculation;

— calculation input data;

— graphs for the geometric model, including boundary and compatibility conditions;

— stresses, displacements and strains, where necessary;

— the stresses in the most critical areas;

— calculation of stress intensities compared with the design stress.

6.2.3 Technical schedule

The technical schedule shall consist of:

— a detailed description of the fabrication/installation plan;

— welding procedure specifications together with the welding procedure approval records;

— NDT procedures;

— heat treatment procedures, where applicable;

— leak testing procedures, where applicable;

— pressure test procedures where necessary;

— any additional procedures specifically requested.

6.3 Performance of design review

6.3.1 System design review

A review of isometrics and/or construction drawings, including parts lists and technical schedules, shall be performed with regard to operating conditions of the following items:

— the suitability of the material for the pressurised and un-pressurised parts including the required material inspection documents;

— the suitability of welding procedure specifications and approvals;

— suitability of weld joint design;

— provision for appropriate in-service testing and inspection ,where necessary;

— structural stability, including supports and fixed points;

— provision and adequacy of safety devices.

The system design review shall be performed against the requirements of this European Standard.

6.3.2 Review of design calculations

The review of design calculations shall be carried out to verify that the dimensions specified meet the requirements of EN 13480-3:2012. The review shall also ensure that the stresses considered include pressure, temperature and that all loads that may be applied during operating and testing have been considered.

6.3.3 Incomplete documentation

When all required data is not available at the time of the design validation, fabrication/installation may proceed provided it shall not go beyond the applicable fabrication/installation stage, until approval is received.